Weekly Report for 04/20/2015

APS Renewal and Upgrade

• MOGA optimization on alternate lattice with reverse bends, emittance 76pm. (Yipeng Sun)

• On Friday, attended MBA Radiation Physics meeting. (Jeff Dooling)

• Gave a presentation on the transverse monopole wake, showing that vacuum chamber asymmetries can lead to incoherent emittance growth. Discussed possible consequences for APS-U with R. Lindberg. (Joe Calvey)

• Ran ion simulation code by L. Wang with different vertical beam sizes in the PAR. Showed that with smaller beam size, Hydrogen ions are not trapped, though the tune shift is still much larger than measured. Tried unsuccessfully to get space charge working in the code. Added the option to "shake" the beam, to see how this affects ion trapping. (Joe Calvey)

• Learning to run GdfidL. Created a model for the PAR pump slots; calculated longitudinal and transverse wakes (both are small). (Joe Calvey)

• Working with J. Carter, L. Morrison and B. Stillwell from vacuum group (as well as CY Yao and K. Harkay) to improve our understanding of the PAR vacuum. Helped Jason create a sophisticated model that takes into account the chamber geometry, photon emission and scattering, photon stimulated desorption, and pumping through the vacuum chamber slots. (Joe Calvey)

• Got a tutorial in running elegant from R. Lindberg. (Joe Calvey)

MCR Operations

Linac Operations

• worked on new system reference files for RG1 and RG2 operations. (Yin-e Sun)

• Inspected frequency doubling crystals in the regen amplifier enclosure; they appeared to be okay. (Jeff Dooling)

• Removed the thin film polarizer after uv attenuator to increase uv energy. Saw EM3 rise more than 50 percent. (Jeff Dooling)

• Remeasured pump diode current and diode emission. Observed that levels continue to drop from March to April; this time by about 20 percent. (Jeff Dooling)

ITS Operations

• verified the performance of the thermionic rf gun installed at the ITS. Tested polarities of all the steering magnets and quadrupoles for consistency. (Yin-e Sun)

APS Machine Studies

Storage Ring Studies

• Tune measurements. (Yipeng Sun)

• Tune scan on RHB injection efficiency. (Yipeng Sun)

Booster Studies

• Helped with CY's booster tune shift measurement. Also ran his booster corrector magnet optimization script. (Joe Calvey)

PAR Studies

• Re-did measurement of tune shift along PAR cycle, with increased gas pressure. The tunes appear to saturate faster, though the total shifts are about the same as before. (Joe Calvey)

Linac Studies

• worked on RG1 and RG2 beam tune up. During the April 2015 injector studies, developed a procedure when trying to setup the linac for beams generated by RG1 and RG2 of the APS linac. The goal is to deliver over 1.1 nC per rf pulse to and through the PAR without stressing the rf guns and the kickers. Average current out of the gun is kept at 280 mA. The procedure has been used successfully to generate new operation configuration files for both guns, meeting the charge requirement from PAR to booster. (Yin-e Sun)

• Participated in pc gun studies with Yine Sun. Seeing lower average charge on phase scans at 2 Hz than at 6 Hz even though the laser energy is higher at 2 Hz. (Jeff Dooling)

• Still having problems with magnets. (Jeff Dooling)

APS Machine Research and Development

Linac Research and Development

• Extracted PC gun beam and send to the first accelerating structure in the linac, beam image captured at the YAG screen at the entrance of L1:AS1. (Yin-e Sun)

• Measured cathode QE to be around but less than 2e-5. Hower later discovered that UV drive laser has two more pulses following the main peak -- these followers contribute to the UV energy measurement but do not produce photo-electrons. therefore, cathode QE should be higher than calculated and documented in the elogs. (Yin-e Sun)

APS Machine Software

Storage Ring

• finished SRUnifiedSteeringConfig implementation, tested and added SVD analysis to UF steering. (Hairong Shang)

• tested BTSOrbitCentering with Aimin, and CY, and measure BTS magnets offsets. installed BTSOrbitCentering to OAGapps menu. (Hairong Shang)

Injectors

• worked with Hairong to develop a laser raster scan script for future laser-cathode cleaning. (Yin-e Sun)

• did PC gun laser cleaning experiment with Yine, tested and fixed script bugs. (Hairong Shang)

• did booster ramp delay ripple test study with CY to investigate why QD ramp has big errors in the end. The first test was done through adding the ripple at 100ms to safety ramps, loading safety and then do ramp corrections, the ramp corrections could not make the ripple disappear; this was because that when loading the safety ramps, the safety ramp was copied into current reference ramp; therefore, we need to restore the reference ramp after loading safety; the ramp correction was able to correct the ripple after doing so, and tested the delays, QD seemed to be normal. Guess the big errors at the end was because of the corrupted safety ramp, we need to create a cleaner safety ramp for QD. -- will write an elog for this study for future reference (so that we do not make such mistake again). (Hairong Shang)

General

• installed sddsfresnel for calculating one dimensional Fresnel diffraction patterns of a general mask design for point and Gaussian sources. (Hairong Shang)

• start working 2d sddsfresnel (Hairong Shang)

Publications, papers and report

• Documented the procedure of 'Experimental Optimization of the Transportation and Matching of t he Thermionic RF Gun Beams at APS Linac', APS_1684426. (Yin-e Sun)

• Co-author of two IPAC papers, "RF Conditioning of the Photo-Cathode RF Gun at the Advanced Photon Source ? llrf results" and "Initial EEX based bunch shaping experimental results at the argonne wakefield accelerator facility". (Yin-e Sun)

• RHB lattice injection efficiency studies, AOP-TN-2015-019, Yipeng Sun (Yipeng Sun)

• Measurement of septum position using BPM setpoint at APS storage ring, AOP-TN-2015-018, Yipeng Sun (Yipeng Sun)

• Beam based physical aperture scan at ID4, AOP-TN-2015-016, Yipeng Sun (Yipeng Sun)

• Submitted paper TUPJE064 to IPAC15 entitled, "Calibration of Fast Fiber-Optic Beam Loss Monitors for the Advanced Photon Source Storage Ring Superconducting Undulators." (Jeff Dooling)

• Provided input on CY Yao's IPAC paper on injector system upgrades. (Joe Calvey)

• Wrote an IPAC paper summarizing the impedance work I did at Cornell. (Joe Calvey)

Meetings, workshops, conferences, committees, LMS related, and reviews

• Invited local laser experts and called for a meeting to brainstorm on our photocathode drive laser problems: low UV power, UV pulses has follow travellers, etc. The meeting is fruitful and we got good advice on what might be wrong with our regen system, we also got practical help from Fermi lab allowing our laser people (Dooling) to use their facility to test our diodes. (Yin-e Sun)

• Participated the emittance exchage experiment and attended emittance exchage meeting at AWA. (Yin-e Sun)

Safety and Required Training

• Took ASD 115 and ASD125 training cources. (Yin-e Sun)

Miscellaneous

• Annual Leave Tuesday. (Jeff Dooling)